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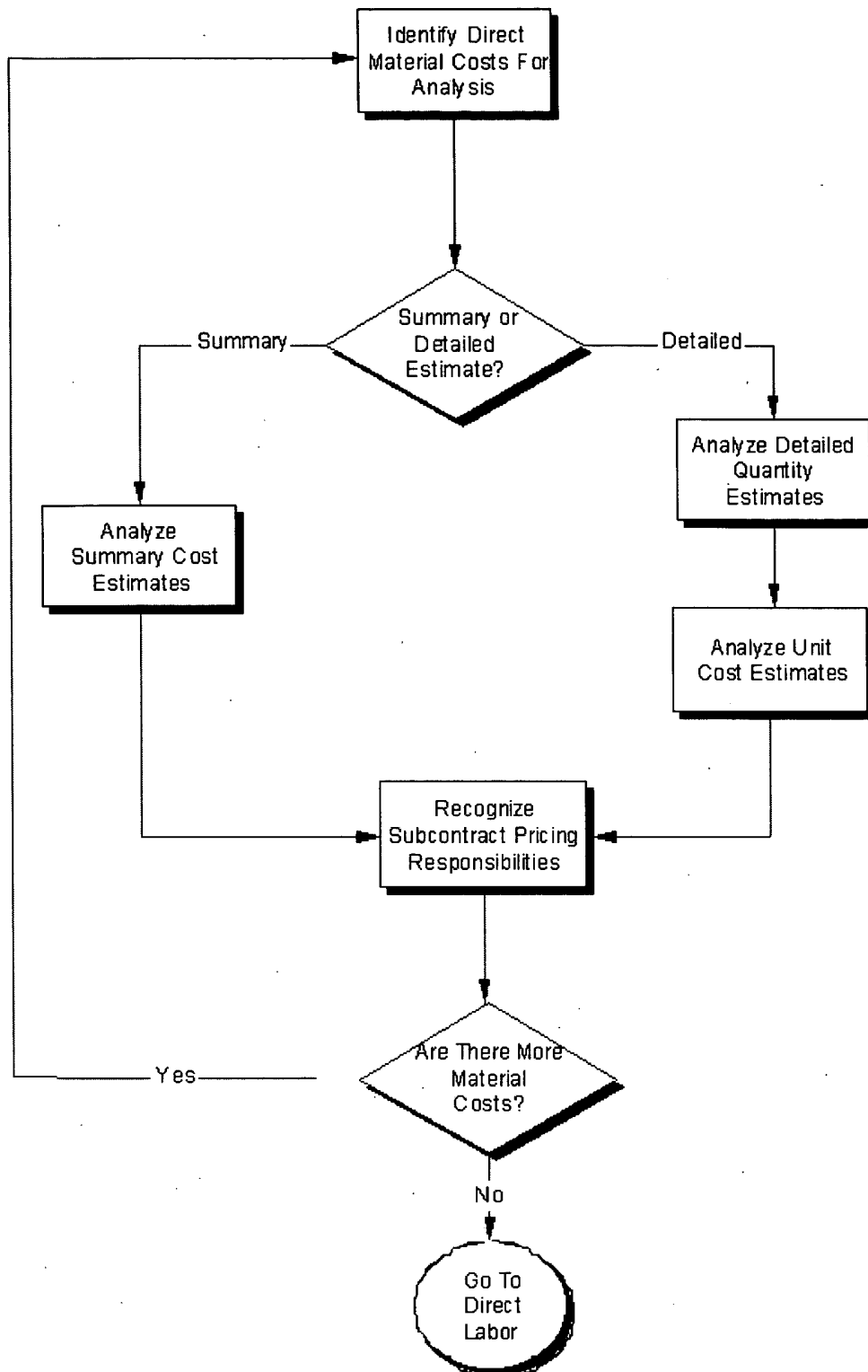
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6.0 Chapter Introduction

Direct material costs often account for more than half of total contract cost. This chapter will present points to consider when you develop a prenegotiation position on direct material costs.

Flowchart of Direct Material Costs Analysis:



6.1 Identifying Direct Material Costs For Analysis

This section will identify the types of cost that may be classified as direct material costs and points to consider in planning for further analysis.

- 6.1.1 - Identifying Material Cost Elements
- 6.1.2 - Identifying Collateral Costs
- 6.1.3 - Identifying Related Costs
- 6.1.4 - Planning For Further Analysis

6.1.1 Identifying Material Cost Elements

Material Cost (FAR 31.205-26). The cost of materials used to complete a contract normally includes more than just the cost of the materials that actually become part of the product. Costs typically include:

- Raw materials, parts, subassemblies, components, and manufacturing supplies that actually become part of the product;
- Collateral costs, such as freight and insurance; and
- Material that cannot be used for its intended purpose (e.g., overruns, spoilage, and defective parts).

Direct vs. Indirect Material Cost (FAR 31.202 and 31.203). Each firm is responsible for determining whether a specific cost will be charged as a direct cost or an indirect cost, and you will find that accounting and estimating treatment will vary from firm to firm. This section describes the general practices that you can use to identify direct material costs for analysis.

- **Direct Material Cost.** A direct material cost is any material cost that can be identified specifically with a final cost objective (e.g., a particular contract).
 - Material costs identified specifically with a particular contract are direct costs of the contract and must be charged to that contract.
 - Material costs must not be charged to a contract as a direct cost if other material costs incurred for the same purpose in like circumstances have been charged as an indirect cost to that contract or any other contract.
 - All material costs specifically identified with other contracts are direct costs for those contracts and must not be charged to another contract directly or indirectly.
- **Indirect Material Cost.** An indirect material cost is any material cost not directly identified with a single final cost objective, but identified with two or more final cost objectives or an intermediate cost objective. For reasons of practicality, any **direct material cost of minor dollar amount** may be treated as an indirect cost if the accounting treatment:
 - Is consistently applied to all final objectives, and
 - Produces substantially the same results as treating the cost as a direct cost.

Accounting for Materials. The following table matches material types with their most common accounting treatment. This table is only a general guide. Proper accounting treatment will vary with different acquisition environments and the specific accounting guidance adopted by the firm.

Material Type*	Description	Accounting Treatment
Raw Materials	Materials that require further processing	Normally a direct cost
Parts	Items which, when joined together with another item, are not normally subject to disassembly without destruction or impairment of use	Normally a direct cost but possibly an indirect cost if price is very small
Subassemblies	Self-contained units of an assembly that can be removed, replaced, and repaired separately	Normally a direct cost
Components	Items which generally have the physical characteristics of relatively simple hardware items and which are listed in the specifications for an assembly, subassembly, or end item	Normally a direct cost
Manufacturing Supplies	Items of supply that are required by a manufacturing process or in support of manufacturing activities	Normally an indirect cost
* The material types in this table are drawn from FAR 31.205-26(a), Material Costs. The terms reflect a manufacturing orientation. When analyzing material costs proposed for services or construction, compare the proposed use of the materials with the definitions in this table for the most appropriate accounting treatment. Also, consider the general guidance offered on the previous page.		

6.1.2 Identifying Collateral Costs

Collateral Cost Accounting Treatment (FAR 31.205-26(a)). Collateral costs are expenses associated with getting materials into the offeror's plant. Inbound transportation and intransit insurance are two common examples. These costs may either be treated as direct costs or indirect costs depending on the guidelines established by the firm. If they are treated as direct costs, they are normally tracked with the cost of the associated material item.

As you perform your cost analysis, make sure that the proposed treatment is consistent with the firm's treatment of similar costs under similar circumstances. Also make sure that the offeror is not charging twice for the same

transportation and insurance cost. The cognizant Government auditor will be able to assist you in determining whether the proposal correctly recognizes transportation costs consistent with the offeror's prescribed accounting practices.

For example: When an item is bought f.o.b. destination the price normally includes delivery to a point designated by the buyer. Unless some type of special handling is required, the buyer should not have any additional transportation or in-transit insurance costs.

Inbound Transportation (FAR 31.205-26(a) and 31.205-45). Inbound transportation cost, also known as freight-in expense, is the cost of transporting material to the place of contract performance. It may be the cost of transportation from the supplier's plant or some intermediate shipping point. This cost is allowable as long as it is reasonable, but remember that this cost should be included in any price quoted f.o.b. destination.

Intransit Insurance (FAR 31.205-19, 31.205-26(a), and 31.205-45). The intransit insurance expense related to material is the cost of insurance for inbound material. Any costs of insurance required or approved by the Government and maintained by the contractor under a Government contract are allowable. The cost of intransit insurance not specifically required or approved under a Government contract must meet appropriate FAR and CAS requirements. The most basic requirements are that the types and extent of insurance must follow sound business practice, and the rates and premiums must be reasonable.

6.1.3 Identifying Related Costs

Accounting for Related Materials (FAR 31.205-26(b)). Identify estimates of excess materials that the offeror proposes to purchase to assure that sufficient material is available for production of the item. Estimates may include costs related to material overruns, scrap, spoilage, or defective parts.

- Some offerors will develop a single estimate which encompasses all of these costs. When a single estimate is used, it is usually referred to as scrap.
- Other offerors will develop separate estimates for several of the different types of excess material cost. When a firm develops separate estimates, make sure that each type of excess material cost is clearly defined and that the same costs do not appear in different estimates.

Estimates of these costs are usually developed using a cost estimating relationship (CER) -- a relationship between the cost and some independent variable related to a parameter of the item or service being acquired or a related contract cost. The proposal and related documentation must provide adequate analysis and statistical data to identify and support any CER used in estimating direct material cost.

Remember that material overruns, scrap, spoilage, or defective parts not used on the proposed contract will still have residual value. The offeror might use this material in producing other products, or sell it for reclamation or reprocessing. As a result, the estimated contract cost must be adjusted to consider that residual value. The offeror might adjust the proposal by subtracting the estimated residual value from the estimated direct material cost. More commonly, offerors will estimate the residual value of such material for all contracts for the year and then subtract that estimated amount from an appropriate overhead account. Each contract proposal estimate is then reduced by use of the lower overhead rate.

Overruns. Simply stated, overruns are the purchase or production of more units than are required by the job.

For example: A minimum order quantity requirement is a common example. An assembly requires 25 units of a special fastener that can only be bought in quantities of 100. If the fastener can only be used on the one contract, you should expect to pay for all 100 units. On the other hand, if the fastener has general application to other items produced by the firm, you should expect to only pay only for the units used on your contract.

Scrap. Scrap is material that is no longer usable for the purpose for which it was originally purchased.

For example: A casting may require machining prior to its use as part of a larger assembly. The material removed during the machining process is scrap. A sheet of metal may have a variety of shapes cut from it. The leftover pieces that are too small to cut into the required shapes are scrap.

Spoilage. There are many kinds of spoilage. Some of the more common types of spoilage are:

- **Shelf-life.** Shelf-life is the length of time some materials retain their usable properties while waiting to be used, after that time they must be discarded.

For example: Industrial silicon rubber compounds are used as coatings or adhesives in many manufacturing processes. If these compounds are not used within a certain time period (their shelf-life), they lose their usable properties and have to be discarded.

- **Losses.** Material losses are discrepancies between inventory records and physical inventory. Normally, these discrepancies are discovered during physical inventories. The inventory records indicate that the material is there, but an actual count finds that the material is no longer available. When inventory records indicate that the inventory includes more material than the physical count, the excess material must be removed from the inventory records or "written off."

For example: Lost materials may have been stolen, inadvertently discarded, or misplaced.

- **Obsolescence.** This can occur anytime there is a large inventory that will meet needs for a long period. Materials may become obsolete due to design changes that require new parts or materials, thus rendering the old inventory useless.

For example: Item specifications are changed. A production part is now obsolete because it is no longer needed for production.

Defective Parts. Defective parts are items that fail to meet required specifications. Depending on the severity of the defect, such parts can be scrapped, reworked, or "used as is." Defective parts are also known as "yield." Whether a defective part is usable as is, reworkable, or just scrap, there are costs associated with the action that must be considered in a cost estimating and analysis.

- **Scrap.** If the defective part cannot be used for its intended purpose or made usable, it will usually be charged as scrap.
- **Rework.** This is the process of taking the defective part and working on it again to correct the identified defects. If, after rework, the item meets specifications, it can be accepted. If the reworked item fails inspection again, it may be either reworked again or scrapped.

Rework cost is normally seen in labor expense. However, rework does help reduce scrap costs. Depending on the offeror's accounting system, the material used during rework may be accounted for separate from normal scrap.

- **Use as is.** This means that, while the part does not meet all contract requirements, the defect does not affect the part's ability to perform its intended function.

After a part has been properly examined and approved for use by the offeror's quality system, a "use as is" part, it can be incorporated into the end product. The costs associated with making the "use as is" decision are normally quality assurance labor and overhead. The value of the part is not affected unless a specific cost reduction is negotiated by the contractor and the Government.

6.1.4 Planning For Further Analysis

Points to Consider. As you prepare your plan for direct material cost analysis, look for indicators of uneconomical or inefficient practices. Material items with a large dollar value or unusual requirements normally rate in-depth analysis. If an element of proposed material cost appears suspicious, concentrate more analysis effort on that element than on a less suspicious cost element of similar dollar value. As you plan:

- Identify and evaluate the methodology used by the offeror to estimate direct material cost
- Identify any proposed direct material that does not appear necessary to the contract effort
- Identify any proposed direct material that should be classified as an indirect cost
- Identify any proposed direct material costs that merit special attention because of high-value or other reasons
- Assure that preliminary concerns about material cost estimates are well documented

Identify and Evaluate Estimating Methodology. To identify and evaluate the methodology used by the offeror to estimate direct material cost, ask questions such as the following:

- *Is the estimate a summary-level or a detailed estimate?*

In a summary estimate, material cost is estimated on a total-cost basis without the benefit of a detailed cost breakdown of material units and cost per unit. In a detailed-level estimate, material cost is estimated based on estimates of the number of material units required and the cost per unit.

◦ ***Does the methodology appear appropriate for the current estimating situation?***

The method selected should use the information available to produce reasonable and equitable results. If the methodology used by the offeror does not appear appropriate, consider using a different methodology to develop your pricing position.

◦ ***Is the estimating methodology consistent with estimating assumptions?***

If any part of the estimate is not consistent with stated estimating assumptions, question the costs involved.

Identify Apparently Unnecessary Material Cost. To identify any proposed direct material that does not appear necessary to the contract effort, ask questions such as the following:

◦ ***Is the material necessary?***

The reasons for any direct material not obviously required for contract performance should be clearly described in the proposal.

◦ ***Should the item be purchased, not made (or vice versa)?***

Mark any item where the make-or-buy decision does not appear to result in the best value to the Government. There may be good reasons why such a decision will produce the best value to the Government, but the decision may also represent an attempt by the offeror to gain advantage at Government expense (e.g., gain capability in new technology currently available from potential subcontractors at a lower total contract cost).

◦ ***Can less expensive material be substituted, in whole or in part?***

Sometimes, proposed material may be over specified (i.e. excessively tight tolerances). Consider using value engineering techniques to identify less expensive parts (e.g., a commercial part might be available to replace a part made to unique Government requirements).

◦ ***Is the material acceptable under terms of the contract?***

If the contract requires new materials, or material certifications in accordance with specifications or standards, then the proposed materials must meet those requirements.

Identify Any Material That Should be Indirect. To identify any proposed direct material that should be classified as an indirect cost, ask questions such as the following:

◦ ***Has the offeror consistently treated material similar to the proposed material as direct material?***

If similar material has been treated as an indirect cost under similar circumstances, proposed material should likely also be an indirect cost. If the offeror classifies similar material as a direct cost in one situation and as an indirect cost in a similar situation, there is a good chance that you are being double charged -- once as a direct cost and a second time as an indirect cost! If in doubt, contact the cognizant Government auditor for assistance.

◦ ***Is the material cost proposed and accounted for in a manner consistent with the contractor's disclosure statement and documented accounting practices?***

Question any apparent inconsistencies. If you have any questions, check with the cognizant Government auditor.

Identify Material Costs Which Merit Special Attention. To identify any proposed direct material costs that merit special attention because of high-value or other reasons, ask questions such as the following:

- ***Is any material estimate a large portion of the entire material cost estimate?***

Many times a single estimate will be a large part of the entire estimate. That estimate will normally merit special attention because of the dollars involved.

- ***Is any material uniquely critical to contract performance?***

Many times a specific material item is essential for contract performance. Related estimates may merit special attention, because the offeror may be willing to pay "any price" for the material.

Document Material Cost Concerns. To assure that preliminary concerns about material cost estimates are well documented, ask questions such as the following:

- ***Have you identified material estimates that merit special attention?***

If the answer is "yes" document the areas of concern for reference as you perform more in-depth analysis.

- ***Has the offeror had an opportunity to answer your concerns?***

Consider raising these concerns in fact-finding conversations with the offeror. If the problem is an error in the proposal, bring the error to the offeror's attention so that it can be corrected prior to formal negotiations.

6.2 Analyzing Summary Cost Estimates

Steps for Summary Estimate Analysis. In a summary material cost estimate, material cost is estimated on a total cost basis without the benefit of a detailed cost breakdown of units and cost per unit. Summary estimates may be round-table or comparison estimates. Round-table estimates commonly use words such as "engineering estimate" or "professional judgment." Comparison estimates involve the use of some form of comparison based on data from efforts completed or in progress.

As you conduct your analysis of summary direct material cost estimates:

- Give special attention to any direct material concerns identified during your preliminary review of the material mix.
- Determine whether use of summary cost estimates is appropriate for the estimating situation.
- Determine which summary estimating technique(s) was used in proposal development.
- Determine if cost estimating relationships (CERs) used in the proposal were properly developed and applied.
- Determine if direct comparisons used in the proposal have been properly developed and applied.
- Develop and document your prenegotiation position on direct material cost.

Determine If Summary Estimates Are Appropriate. To determine whether the use of a summary cost estimate is appropriate for the estimating situation, ask questions such as the following:

- ***Does the item cost warrant the expense of a detailed estimate?***

The time and effort put into an analysis needs to be commensurate with the cost of the material involved. As the dollars and percentage of total cost increase, emphasis on obtaining a detailed estimate should also increase.

- ***Do the cost accounting data provide a clear history?***

If detailed cost data do not provide a clear material cost history, then summary estimating techniques may be the most viable alternative.

- ***Would the summary-level analysis be as accurate as a detailed analysis?***

If the summary-level estimate is as good as a detailed analysis, then it is more cost effective to use the less costly summary analysis.

Determine Which Summary Estimating Technique Was Used. To determine which summary estimating techniques were used in proposal development, ask questions such as the following:

- ***Has the offeror estimated direct material cost using a cost estimating relationship (CER)?***

Estimators can use a CER to estimate costs based on an established relationship between the cost and some independent variable. The independent variable may be a parameter of the item or service being acquired (e.g., item size or speed), or another contract cost (e.g., direct labor cost).

For example: An offeror might use a CER to estimate material cost for a research and development (R&D) contract. Since the purpose of an R&D contract is to learn about the unknown, there is likely no firm list of material requirements to use as a basis for estimate development. However, it may be possible to develop a CER based on the relationship between material cost and a related independent variable (e.g., material cost per direct labor dollar or material cost per direct labor hour). Of course the offeror should clearly document development and use of the CER.

- ***Has the offeror estimated direct material cost using a direct comparison with the cost of a similar contract effort?***

A direct comparison is just that, a comparison with the cost of a similar contract effort. The similar effort could be a contract or contracts for the same product or a similar product. The assumption is that contracts with similar material requirements will have similar material costs. If this assumption is valid, the estimator can use the historical cost to estimate the cost of the new contract. When preparing the estimate, the estimator should consider the need to adjust historical costs for differences in the acquisition situation (e.g., changing value of the dollar, labor improvement, and differences in work complexity). The proposal should clearly document the similarity in material requirements and the rationale for any adjustments required to compensate for differences in the acquisition situation.

Determine If CERs Were Properly Developed and Applied. To determine if cost estimating relationships (CERs) used in the proposal were properly developed and applied, ask questions related to the issues and concerns associated with CER development.

- ***Does the available information verify the existence and accuracy of the proposed relationship?***
- ***Is there any trend in the relationship?***
- ***Is the CER used consistently?***
- ***Has the CER been consistently accurate in the past?***
- ***How current is the CER?***
- ***Would another independent variable be better for developing and applying a CER?***
- ***Is the CER a self-fulfilling prophecy?***
- ***Would use of a detailed estimate or direct cost comparison with actuals from a prior effort produce more accurate results?***
- ***Does the CER estimate consider the changing value of the dollar?***

Determine If Direct Comparisons Were Properly Developed and Applied. To determine if direct comparisons used in the proposal have been properly developed and applied, ask the following questions:

- ***Is the basic nature of the new contract effort similar enough to the historical effort to make a valid comparison?***
- ***Does data analysis consider the changing value of the dollar?***
- ***Were there significant cost problems or inefficiencies in the historical effort that would distort the estimate on the new effort?***
- ***Have there been significant changes in technology or methods that would distort the estimate on the new effort?***
- ***If the historical costs have been adjusted in any way, are the adjustments reasonable?***
- ***Are there any significant differences in the material mix between the two efforts?***
- ***Did the offeror assume any improvement from historical effort to the current effort? If not, why not? If so, does the estimate properly consider improvement curve theory?***

Develop and Document Your Prenegotiation Position. As you develop and document your prenegotiation position on direct material cost:

- If you accept the offeror's summary estimate, document that acceptance.
- If you do not accept the summary estimate, document your concerns with the estimate and develop your own prenegotiation position for costs covered by the estimate.
- If you can identify information that would permit you to perform a more accurate analysis of material costs, use the available information. Your analysis is not bound by the estimating methods used by the offeror.

6.3 Analyzing Detailed Quantity Estimates

Detailed Direct Material Cost Estimates. A detailed cost estimate is more costly to develop and analyze than a summary estimate. However, when properly completed, the accuracy of a detailed estimate should compensate for the additional cost.

To prepare a detailed direct material cost estimate the estimator must first prepare an estimate of the material quantities required to complete the contract and then estimate the unit price for that material. Estimated material quantities will include the material that will become part of the product and any additional material required to compensate for material overruns, scrap, spoilage, and defective parts. Estimated prices must consider the total quantities required.

Bill of Materials (FAR Table 15-2). A bill of materials is a listing of all the materials, including the part numbers and quantities of all the parts required to complete the contract. When the contract is complex, there may be individual bills of material for different contract tasks or line items. If the estimate includes more than one task or item bill of materials, the offeror must submit a consolidated bill of materials for all items, with a breakdown suitable for analysis. The estimate must identify the item, the source, the quantity, and the price.

For supply and construction contracts, the estimator should estimate base material requirements for the bill of materials using contract drawings and specifications. Estimates of additional material requirements to compensate for material overruns, scrap, spoilage, and defective parts should be based on offeror experience and contract requirements.

Service contracts may not include drawings and specifications, but direct material quantity estimates will still be based on an analysis of contract requirements and offeror experience. These quantity estimates may be based on a detailed analysis of contract requirements or on comparisons with the material quantities actually required to complete similar contracts.

The table below presents an example of a priced consolidated bill of materials to produce 500 units of a product.

Part Number	Item and Source Information	Quantity per Assembly	Scrap Factor	Total Quantity	Unit Price	Total Price
9876543	Housing casting. (Vendor: PIC Corp. PO 351522, issued 12/20, competitive)	1	4%	520 ea.	\$84.72	\$44,054.40
9876542	Bearing. (Vendor: Sun Co. PO 351480, issued 12/5, noncompetitive).	2	12%	1120 ea.	\$14.87	\$16,654.40
9876541	Gear, 14 tooth. (Vendor: AUTOCO, competitive)	4	8%	2160 ea.	\$4.18	\$9,028.80
9876540	Cable Assembly (Vendor: Rockway Corp., noncompetitive)	1	4%	520 ea.	\$328.00	\$170,560.00
9876539	Bracket, main. (Vendor: Cee Corp., prior price was \$22.19 ea. (PO 341110) 8% added in making estimate, two years since last buy)	3	1%	1515 ea.	\$23.97	\$36,314.55
9876538	Race assembly. (Similar item bought 5/25 from HUP, Inc. for \$150 ea. Engineering estimates that new item will cost 1/3 more)	1	2%	510 ea.	\$200.00	\$102,000.00
9876537	Solenoid. (Engineering estimate)	1	3%	515 ea.	\$90.00	\$46,350.00
9876536	Gear, drive. (Engineering estimate)	1	3%	515 ea.	\$24.00	\$12,360.00

(estimate)					
Total Material					\$437,322.15

Points to Consider When Analyzing Detailed Quantity Estimates. As you conduct your analysis of detailed direct material quantity estimates:

- Give special attention to any direct material quantity concerns identified during your preliminary review of the material mix.
- Select a sampling strategy for analysis.
- Determine the reasonableness of the base estimate of direct material quantities required to complete the contract.
- Determine the reasonableness of any adjustments to the base estimate of direct material quantities required to complete the contract.
- Develop and document your prenegotiation position on direct material quantities required to complete the contract.

Sampling Strategy for Analysis. If the proposal includes only a few material items, you may have time to review all bill of materials items. For larger proposals with more items, you will probably need to limit your review to an item sample.

Consider using stratified sampling procedures that permit you to give more attention to high-value items, but still consider all bill of materials items. You can then adjust item estimates based on analysis results. A reduction to proposed costs is commonly called a **decrement**, and the percentage adjustment a **decrement factor**.

For example: You draw a sample from all material items with an extended cost of \$1,000 or less. In analyzing that sample, you find that the sampled items are overpriced by five percent. The proposed cost of all items in the sampled stratum (\$1,000 or less) should be reduced by five percent. The reduction is referred to as a decrement and the five percent is a decrement factor.

Determine the Reasonableness of the Base Estimate. The base quantity estimate is the quantity of material that will actually be used in the final product. Technical personnel should be able to verify this quantity by comparison with drawings and other relevant contract requirements.

Determine the Reasonableness of Any Adjustments. The actual direct material required to produce a product will likely exceed the material that will be included in the product. The reasons for this difference typically include material overruns, scrap, spoilage, and defective parts. All these costs are normally estimated using cost estimating relationships (CERs) based on the base estimates of direct material required to produce the product. Your analysis should center on assuring that the estimate is reasonable.

In the bill of materials example above, examine the estimate for Part Number 9876543. A total of 520 parts must be purchased to complete assemblies requiring 500 parts. The additional 20 parts are estimated to be scrap.

Adjustment factors are normally based on accounting data and statistical analysis or other relevant experience. The most common method of calculation is a moving average, incorporating 6 to 12 months of data.

For example: CERs used to estimate the cost of scrap may be calculated using either dollars or units of material and are commonly calculated in one of the following ways:

$$\frac{\text{Scrap Dollars}}{\text{Total Assembly Material Dollars}} \quad \text{or} \quad \frac{\text{Scrap Units}}{\text{Total Assembly Material Units}}$$

$$\frac{\text{Scrap Dollars}}{\text{Material Dollars Purchased}} \quad \text{or} \quad \frac{\text{Scrap Units}}{\text{Material Units Purchased}}$$

As you analyze any adjustments to the base bill of materials quantities, consider the answers to the following questions:

- **If a CER (e.g., a scrap factor) is used to estimate adjustments, did the offeror consider the issues and concerns associated with CER development?**

Quantitative Techniques for Contract Pricing (Volume II) identifies a series of questions related to issues and concerns that you should consider when evaluating any CER.

- ***Do you know what types of material costs are covered by the CER?***

Material costs estimated using a CER must not duplicate material costs estimated using some other method. A CER developed to estimate the cost of scrap for electronic components should normally not be used to estimate the cost of scrap for metal components.

- ***Is the method used to apply the CER in the estimate consistent with the method used in rate calculation?***

The independent variable used as a base for applying the CER (e.g., total assembly material dollars) must be the same as the base used to calculate the CER and the value of the independent variable must be calculated using the same procedures used in CER development.

- ***Does related estimate information indicate that the additional material amounts are consistent with past experience?***

A CER or another method of adjustment may produce results that do not appear reasonable based on past experience. In such situations, consider the need for further analysis.

- ***Are the materials, tolerances, and processes similar to those used to calculate the CER?***

Note that different items in the consolidated bill of materials example above have different scrap rates. Some materials tend to produce more scrap than others in similar processes. Tighter tolerances tend to produce more scrap. Different processes produce different rates of scrap.

- ***Are the data used to calculate the CER changing over time?***

Experience with the same material and processes should reduce scrap rates. Many CERs that are used to estimate additional material requirements are developed using moving averages to smooth variations in the data. A longer moving average (e.g., 12 months) may mask improvement. A shorter (e.g., 6 months) moving average will react faster to improvement, but may overreact to a random change in the data.

- ***Is the amount of the adjustment for material overruns, scrap, spoilage, and defective parts reasonable from a should-cost viewpoint?***

The CER may be based on history, but does that history represent efficient and effective operations. Consider these related questions:

- Are potential process improvements that would reduce material cost considered by this adjustment?
- Would a different type, size, or shape of material reduce the need for this adjustment?
- What is the offeror doing to reduce the need for this adjustment?

- ***Does the proposal consider the residual value of the material overruns, scrap, spoilage, and defective parts?***

Material that cannot be used for its intended purpose is probably not worthless, and the offeror must consider that residual value in the proposal. Depending on the offeror's accounting methods, this residual value may be credited directly to the contract or credited through an appropriate overhead rate reduction.

Develop and Document Your Prenegotiation Position. As you develop and document your prenegotiation position on direct material quantities, consider the following:

- If you accept the offeror's quantity estimate, document that acceptance.
- If you do not accept the quantity estimate, document your concerns with the estimate and develop your own prenegotiation position for direct material costs covered by the estimate.
- If you can identify information that would permit you to perform a more accurate analysis of material costs, use the available information. Your analysis is not bound by the estimating methods used by the offeror.

6.4 Analyzing Unit Cost Estimates

Points to Consider When Analyzing Unit Cost Estimates. After you have established the quantity of material required to complete the contract, you must analyze the proposed unit costs. As you conduct your analysis:

- Give special attention to any direct material unit cost concerns identified during your preliminary review of the material mix.
- Determine if the offeror used an appropriate base for estimating unit material costs.
- Determine the reasonableness of material unit cost estimates based on current quotes.
- Determine the reasonableness of material unit cost estimates based on historical quotes or purchase prices.
- Determine the reasonableness of material unit cost estimates based on inventory pricing.
- Determine the reasonableness of interorganizational transfers.
- Develop and document your prenegotiation position on unit costs for direct materials.

Determine Appropriateness of Estimating Bases. There are three general bases commonly used for estimating direct material unit prices for future contract performance. Use the following table as you determine whether the base used by the offeror is appropriate under the circumstances.

Use estimates based on:	When the following conditions exist:
Current Quotes	<p>Work will be performed using materials not currently in inventory;</p> <p>Material prices may vary significantly from current inventory values;</p> <p>There is sufficient lead time to acquire materials being estimated; and</p> <p>There is sufficient proposal preparation time for the offeror to solicit and receive vendor quotes.</p>
Historical Quotes or Purchase Prices	<p>Work will be performed using materials not currently in inventory;</p> <p>Price changes (or lack of changes) between price history and contract performance are relatively or predictable; and</p> <p>There is sufficient lead time to acquire materials being estimated.</p> <p>(Note: This method is particularly appropriate when there is insufficient proposal preparation time for the offeror to solicit and receive vendor quotes.)</p>
Inventory Pricing	Work will be performed by using materials in the existing inventory.

Analyzing Current Quotes. As you evaluate the reasonableness of material unit cost estimates based on current quotes, consider the answers to the following questions:

- **Are the quotes for quantities required to complete the contract?**

Make sure the vendor quotations match the quantities necessary for the proposed work. For example, if 1,000 units of a part are needed, the quote should be based on 1,000 units. If the offeror is proposing to make five purchases of 200 units, the units are likely to be overpriced, because larger quantity purchases usually mean lower unit prices.

Exceptions. There are two general exceptions to this rule.

- If the items being estimated are used on more than one contract, quantities for all parts required during the time period should be combined in order to obtain the best possible prices through quantity purchasing.
- If the increased cost of holding the product exceeds the potential savings from quantity procurement. Then the contractor may be able to justify buying the product in smaller lots at different times in the production process.

- **Did the proposal consider probable negotiated price reductions?**

If the offeror has a history of negotiating reductions from subcontract price quotes, the proposed material price should reflect the historical proposal reduction (decrement).

Even when multiple prospective subcontractors have submitted "competitive quotes," be on the lookout for purchase orders placed at prices less than the quote.

Most contractors will try to negotiate reductions even with competitive quotes. Techniques the offeror may employ to reduce quoted prices include: asking vendors for another round of best and final offers; continuing negotiations; switching to a lower priced vendor; and increasing order quantities to gain quantity discounts.

If the proposal did not consider negotiated price reductions, consider developing your own decrement factor. For example, if history shows that the offeror commonly negotiates prices five percent below the prices subcontractors propose, you could use a five percent decrement factor to consider the anticipated reduction.

○ **Did the proposal properly consider subcontract terms and conditions?**

Sometimes, special conditions in the business arrangements between the offeror and vendor result in savings to the offeror. These savings should be passed on to the Government. Some examples include:

- **Quotations with escalation already included.** Sometimes the offeror will ask a vendor to quote prices for orders placed over an extended period of time. The vendor will most likely include some escalation in the price for cost increases. While this is acceptable, it would be unacceptable for the offeror to add an additional escalation factor to a vendor quote that already includes escalation for the same period of time.
- **Quantity discount rebates.** Occasionally, you may see an arrangement where the vendor will charge a set price on each individual order and at the end of the year offer a rebate based on the total quantity purchased. If the Government pays the individual order price, the contractor could realize excessive profits through the rebate. The offeror should project the estimated quantity for the year and discount the current quote considering the estimated amount of the rebate or use the estimated rebate to reduce any indirect cost related to material.
- **Priced options.** While the offeror may propose a current quote, there may be an existing order with a priced option for additional quantities at a price lower than the current quote. The price the offeror really expects to pay the vendor is the lower priced option price, and that is the price that should be used to estimate direct material cost.

○ **Has the prime contractor completed subcontract negotiations?**

You will likely find it harder to negotiate price reductions after the offeror has agreed to a subcontract price. However, if the subcontract has been negotiated, do not accept a subcontract cost that you believe is unreasonable just because the price has been negotiated.

○ **Will some (or all) of the contract material come from existing inventory?**

Determine if the offeror will purchase the entire quantity or if some of it will come from existing inventory. Remember that the inventory value may be less than the current market price.

○ **Are there any other significant price-related factors that should be considered in estimating direct material unit cost?**

Determine what price-related factors are built into (or excluded from) the material quotes. For example, if a quote includes surface transportation cost to the prime's plant, do not accept additional surface transportation cost estimates for that material.

○ **What is the nature and adequacy of the subcontract price competition?**

In your evaluation of subcontract competition, ask the same questions about the existence and adequacy of price competition that you would ask in evaluating offers for a Government contract.

○ **How do quotes compare with commercial prices, historical prices, pricing yardsticks, or Independent Government Estimates?**

Be wary of subcontract quotes that are substantially different than commercial prices,

historical prices, pricing yardsticks, or Independent Government Estimates. Ask the offeror to explain the differences, and, in light of those differences, justify the reasonableness of the quoted prices.

Analyzing Historical Quotes or Purchase Prices. As you evaluate the reasonableness of material unit cost estimates based on current quotes, consider the answers to the following questions:

○ ***Was the historical quote or subcontract price reasonable?***

Be cautious as you review material unit cost estimates based on vendor quotes or contract prices paid by the prime contractor. Such estimates assume that the historical price was reasonable. That may not be true. If you have questions, review the offeror's subcontract files and related market information.

○ ***Are there other historical quotes or subcontract prices that support or refute the reasonableness of the estimated price?***

Verify that the subcontract price quote used by the offeror is not unusually high (or unusually low) for the quantity required. For example, the most recent purchase may have been at a relatively higher unit price because the contractor acquired an unusually low quantity.

○ ***Are current material item requirements the same as the historical requirements?***

Changes in specifications can affect material prices. If a particular process, inspection, or specification has been eliminated, the cost of producing the item will most likely drop. If this circumstance exists, the historical price must be adjusted accordingly.

○ ***How has the offeror's specific purchasing situation changed?***

You need to understand the contractor's acquisition situation as it existed in the previous purchase and how the current acquisition situation differs. As a minimum, you should consider the probable affect of changes in:

- Number of sources;
- Quality of sources and competition;
- Quantities purchased;
- Production / delivery rates;
- Start-up costs; and
- Terms of purchase.

○ ***Has the item's production status changed?***

Item prices typically decrease when a part is in continuous production. If the item was in continuous production, but is no longer produced, the vendor may incur start-up costs to begin manufacturing the item again. If an item's production status has changed, the estimator should either adjust historical prices to consider start-up costs and related inefficiencies or use another base to estimate direct material cost.

Remember that the opposite situation can also occur. If the last purchase included nonrecurring costs (e.g., tooling, set-up, or first article expenses) that should not be charged again. The cost of the current item should reflect only recurring production costs.

○ ***How has the general economic situation changed?***

Economic changes are reflected in the general level of inflation or deflation related to the material item. Price index numbers can be invaluable to you in analyzing price changes.

○ ***Is there more recent pricing information available?***

Be alert to possible discrepancies between estimating system information and the purchasing system information. The offeror should always provide you with the most

up-to-date information. However, if the firm's estimators do not communicate effectively with the firm's buyers, the estimators may still be relying on historical costs even though the firm's buyers have obtained current quotes and prices.

Analyzing Inventory Pricing (FAR 31.205-26(d) and App B, 9904.411-50). When the firm intends to use existing inventory to perform the contract, the direct material estimate should be based on one of the five acceptable methods of inventory pricing: first-in-first-out, last-in-first-out, weighted average, moving average, and standard cost. As you evaluate the reasonableness of material unit cost estimates based on inventory pricing, consider whether the offeror consistently uses one (and only one) of those acceptable methods.

- **First-in-first-out (FIFO)**. This method of inventory pricing works just as the name implies. For accounting purposes, you assume that the first unit into the inventory is the first unit to be drawn out. The inventory value assigned to the unit drawn out is the value of the first unit recorded as still being in inventory. It does not matter which unit is physically drawn out of inventory. It could actually be the last unit added to inventory. Under FIFO, the value assigned would still be that of the first unit recorded as being on-hand.

For example: A firm using FIFO has five widgets in inventory. The following are the acquisition costs in order of receipt:

Unit A @ \$100

Unit B @ \$110

Unit C @ \$105

Unit D @ \$115

Unit E @ \$120

During the year, the firm performs three jobs requiring one widget each. Direct material costs for each job would be:

~~Unit A @ \$100~~ Job 1 cost = \$100

~~Unit B @ \$110~~ Job 2 cost = \$110

~~Unit C @ \$105~~ Job 3 cost = \$105

Unit D @ \$115

Unit E @ \$120

The remaining inventory value would be \$235 (\$115 + \$120).

- **Last-in-first-out (LIFO)**. As with FIFO, LIFO is what the name implies. Pricing is based on the assumption that the last, or most recent unit received, will be the first drawn out. Using the same situation as above, but with LIFO, you would get the following:

For example: A firm using LIFO with the following five widgets in inventory and three jobs requiring one widget each would have the direct material cost indicated for each job:

Unit A @ \$100

Unit B @ \$110

~~Unit C @ \$105~~ Job 3 cost = \$105

~~Unit D @ \$115~~ Job 2 cost = \$115

~~Unit E @ \$120~~ Job 1 cost = \$120

The remaining inventory value would be \$210 ($\$100 + \110).

- **Weighted Average.** Under this method inventory unit prices are recalculated at designated times during the year (e.g., quarterly). The weighted average is calculated by dividing the total cost of the inventory on-hand by the number of units on-hand.

For example: A firm using the weighted average method of inventory pricing with the five widgets below in inventory and three jobs requiring one widget each would have a direct material cost of \$110 for each job.

Unit A @ \$100 Job 1 cost = \$110

Unit B @ \$110 Job 2 cost = \$110

Unit C @ \$105 Job 3 cost = \$110

Unit D @ \$115

Unit E @ \$120

Total \$550 for five units

The inventory price for each widget would be the weighted average \$110 ($\$550/5$).
Note: In this example, the weighted average price is the same as the simple average price because there is only one unit at each unit price.

The remaining inventory value would be \$220 ($\110×2).

- **Moving average.** A moving average is calculated in the same way as a weighted average except that the calculation is done every time there is a new addition to inventory.

For example: Five widgets listed in the Original Inventory below are in inventory. During the year, three jobs were performed requiring one widget each. After the completion of Job 1, an additional unit was added to inventory, and inventory prices recalculated.

Original Inventory:

Unit A @ \$100 Job 1 cost = \$110

Unit B @ \$110

Unit C @ \$105

Unit D @ \$115

Unit E @ \$120

Total \$550 for five units

The inventory price for each of the original five widgets would be the weighted average \$110 ($\$550/5$).

Inventory after Completion of Job 1 and addition of Unit F:

4 Units @ \$110 = \$440 Job 2 cost = \$112

Unit F @ \$120 = \$120 Job 3 cost = \$112

\$560

The new moving average price would be \$112 (\$560/5).

The remaining inventory value would be \$336 (\$112 x 3).

- **Standard cost.** Under this method of inventory pricing, the value of inventory equals the number of units times the unit standard cost. Standard costs are usually based either on expected prices for the period in question (sometimes as short as a week) or on prices prevailing at the time the standards are set. Standard costs do not change in response to short-term fluctuations in volume, quantity, or unit costs.

The difference between the acquisition cost and standard cost of inventory units is called a *variance*. Variance adjustments may be handled by making cost adjustments on each job, or if the cost is insignificant, it can be done as an overhead adjustment.

There may be substantial differences between contractor inventory standard cost systems. If you encounter an inventory standard cost system, ask the contractor to identify the source of the applied standards and to explain any variances. Where possible, contact the cognizant Government auditor for assistance.

Inter- Organizational Transfers (FAR 15.403-1(b) and 31.205-26). Interorganizational or interdivisional transfers are materials, supplies, or services that are sold or transferred between divisions, subsidiaries, or affiliates of the contractor under a common control. They require special analysis because any profit included in an interorganizational transfer permits a contractor to pyramid profits by including profit (for other elements of the overall firm) in contract costs. A firm could conceivably create more divisions and transfer material back and forth between those divisions to further increase total profit for the total corporate entity.

- **Transfers at cost.** To prevent contractors from pyramiding profits using interorganizational transfers, the Government has adopted the policy that interorganizational transfers must be made at cost. In other words, the transfer must not include any profit for the division, subsidiary, or affiliate making the transfer. Furthermore, the costs of that division, subsidiary, or affiliate are subject to audit and analysis, just like any other contractor costs.
- **Transfers at price.** However an interorganizational transfer may be made at price (with profit), when all of the following four conditions are met:
 - It is the established practice of the transferring organization to price interorganizational transfers at other than cost (with profit) for commercial work of the contractor or any division, subsidiary, or affiliate of the contractor under common control.
 - The item being transferred qualifies for an exception to statutory requirements for cost or pricing data.
 - When the transfer price is based on a catalog of market price, the price should be adjusted to reflect the quantities being acquired and may be adjusted to reflect the actual cost of any modifications necessary because of contract requirements.
 - The contracting officer does not determine that the price is unreasonable.

6.5 Recognizing Subcontract Pricing Responsibilities

Privity of Contract Concept. The term "privity of contract" refers to the direct relationship that exists between contracting parties.

- The Government has a contract with the prime contractor, therefore there is privity of contract between the Government and the prime contractor.
- The prime contractor has a contract with its subcontractors, so privity of contract exists between the prime contractor and its subcontractors.
- However, the Government does not have a contract with any subcontractor, so no privity of contract exists between the two parties. Since no privity of contract exists, you cannot:
 - Negotiate directly with the subcontractor; or
 - Direct the subcontractor to take any action.

While the Government has an interest in the activities and performance of the subcontractors, you must be careful not to violate the contractual relationship.

Responsibility to Analyze Subcontract Proposals (FAR 15.404-3(b)). The firm awarding the subcontract (the offeror or a higher-tier subcontractor), is responsible for subcontract pricing. At the same time, the contracting officer is responsible for the total price paid by the Government, and must be satisfied that each subcontracting tier has performed an adequate cost or price analysis of each subcontract proposal. Part of that responsibility is to assure that the subcontracting activity has performed an appropriate price or cost analysis.

- **Price Analysis.** The firm awarding a subcontract must perform a price analysis when no cost analysis is performed and should perform a price analysis in conjunction with any cost analysis to ensure overall price reasonableness. This analysis should be similar to one that you would perform in pricing a similar contract under similar circumstances.
- **Cost Analysis.** The firm awarding a subcontract must analyze:
 - Any required subcontractor cost or pricing data, and
 - Any subcontractor cost information other than cost or pricing data required to determine cost reasonableness or cost realism.

The firm awarding a subcontract must include the results of these analyses as part of its own cost or pricing data submission. Lower-tier subcontract analyses become part of higher-tier submissions, and eventually the prime contractor's submission to the Government.

The results of these analyses should help the firm awarding the subcontract to arrive at a fair and reasonable subcontract price. Those same results should provide you with information that will help you arrive at a fair and reasonable contract price.

Consider a firm's failure to analyze subcontract costs as a potentially significant estimating system deficiency. If you believe that an analysis is inadequate or that the subcontract price is unreasonable, question the costs involved. Remember that a firm's failure to perform and submit an adequate analysis could lead to contract overpricing.

Responsibility to Obtain Subcontract Cost or Pricing Data (FAR 15.404-3(c)). Unless the subcontract qualifies for an exception to statutory cost or pricing data requirements, any contractor or subcontractor required to submit cost or pricing data must also obtain cost or pricing data before:

- Awarding any subcontract or purchase order expected to exceed the cost or pricing data threshold, or
- Issuing any modification with a price adjustment amount expected to exceed the cost or pricing data threshold.

Responsibility to Submit Subcontract Cost or Pricing Data (FAR 15.404-3(c)). An offeror required to submit cost or pricing data to the Government must also submit (or cause submission of) cost or pricing data from prospective subcontractors in support of each subcontract priced at the lower of either:

- \$10,000,000 or more, or
- Both more the cost or pricing data threshold and more than 10 percent of the prime contractor's proposed price, unless the contracting officer believes such submission is unnecessary.

The contracting officer may require subcontractor cost or pricing data below these thresholds when the data are considered necessary for adequately pricing the prime contract.

Exceptions to Subcontract Cost or Pricing Data Requirements (FAR 15.404-3(c)). If you are satisfied that a subcontract will be priced on the basis of one of the exceptions to statutory requirements for cost or pricing data, do not require submission of subcontract cost or pricing data.

If the subcontract estimate is based upon the cost or pricing data of the prospective subcontractor most likely to be awarded the subcontract, do not require submission to the Government of data from more than one proposed subcontractor for that subcontract.

Responsibility to Support Subcontract Estimates (FAR 15.404-3). Require the offeror to support subcontractor cost estimates below the cost or pricing data threshold with any data or information (including other subcontractor quotations) needed to establish a reasonable price.

To provide adequate cost estimate support, the offeror may need to obtain information other than cost or pricing data from prospective subcontractors.

Responsibility for Updating Subcontract Cost or Pricing Data (FAR 15.404-3(c)(4)). The offeror is responsible for assuring that subcontractor cost or pricing data are accurate, complete, and current as of the date of price agreement or, if applicable, another date agreed upon between the parties, given on the contractor's Certificate of Current Cost or Pricing Data. Accordingly, the offeror is also responsible for updating a prospective subcontractor's cost or pricing data.

Remember that subcontract proposals are an integral part of prime contract proposals. As a result, when a prospective subcontractor's cost or pricing data are not accurate, complete, and current, the prospective prime contractor's proposal cannot be accurate, complete, and current.

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